

## CLAIMS

1. An etchant of a semiconductor material, being prepared by immersing stainless steel in an alkali aqueous solution for not less than 10 hours.
2. The etchant as claimed in claim 1, wherein the alkali is sodium hydroxide.
3. The etchant as claimed in claim 1 or 2, wherein the stainless steel is one of SUS304 and SUS316.
4. The etchant as claimed in any one of claims 1 to 3, wherein a temperature of the alkali aqueous solution is between 70°C and 90°C.
5. The etchant as claimed in any one of claims 1 to 3, wherein a temperature of the alkali aqueous solution is between 80°C and 87°C.
6. The etchant as claimed in any one of claims 1 to 5, wherein a concentration of the alkali is between 40% and 60% in mass basis.
7. The etchant as claimed in any one of claims 1 to 5, wherein a concentration of the alkali is between 45% and 55% in mass basis.
8. The etchant as claimed in any one of claims 1 to 7, wherein a surface area of the stainless steel is not less than 20cm<sup>2</sup> per a volume of 1 liter of the alkali aqueous solution.
9. The etchant as claimed in any one of claims 1 to 8,

wherein a reducing agent having lower oxidation potential compared with an oxidation-reduction potential of a metal ion existing in the alkali aqueous solution, is dissolved in the alkali aqueous solution.

10. The etchant as claimed in claim 9, wherein the reducing agent is one kind or not less than two kinds selected from the group consisting of dithionite, hypophosphite, boron hydride compound, aldehyde genera, and hydrazine compound.

11. The etchant as claimed in claim 10, wherein the dithionite is sodium dithionite.

12. The etchant as claimed in claim 11, wherein an amount of addition of the dithionite is not less than 2.5g/liter.

13. The etchant as claimed in any one of claims 1 to 12, in which silicon is dissolved.

14. The etchant as claimed in claim 13, wherein an amount of dissolution of the silicon is not less than 2g/liter.

15. The etchant as claimed in any one of claims 1 to 14, wherein the etchant is prepared by using an alkali resistant container.

16. An etchant of a semiconductor material, in which a concentration of a heavy metal ion is not more than  $3 \times 10^{-6}\%$  in mass basis.

17. An etchant of a semiconductor material, in which any one of concentrations of iron ion, copper ion, nickel ion, and chromium ion, is not more than  $5 \times 10^{-7}\%$  in mass basis.

TOP SECRET

18. An etching method comprising the step of etching a semiconductor silicon wafer by using any one of the etchants claimed in claims 1 to 17.

19. A semiconductor silicon wafer, wherein an amount of adhesion of a heavy metal element on a surface after etching in an alkali aqueous solution is not more than  $1 \times 10^{10}$  atoms/cm<sup>2</sup>.

20. The semiconductor silicon wafer as claimed in claim 19, wherein all of the amounts of adhesion of iron, nickel, chromium, and copper on the surface are not more than  $5 \times 10^8$  atoms/cm<sup>2</sup>.

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